

(No Model.)

8 Sheets—Sheet 1.

L. L. MILLER.
SEWING MACHINE.

No. 515,712.

Patented Feb. 27, 1894.

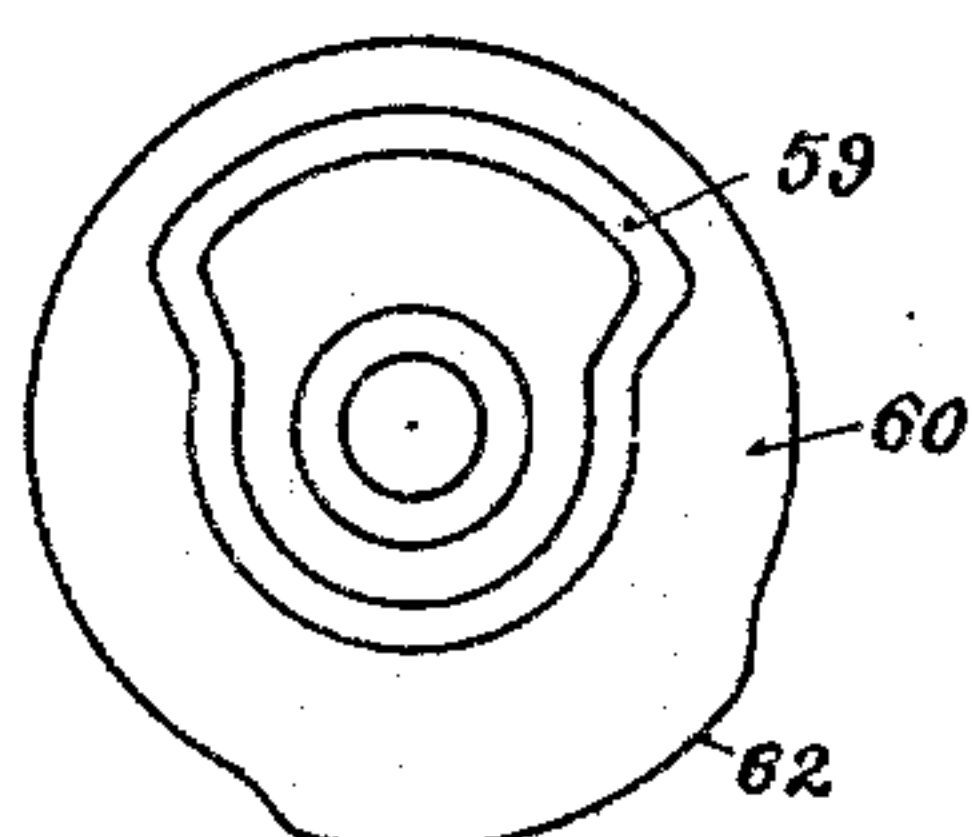


Fig-4-

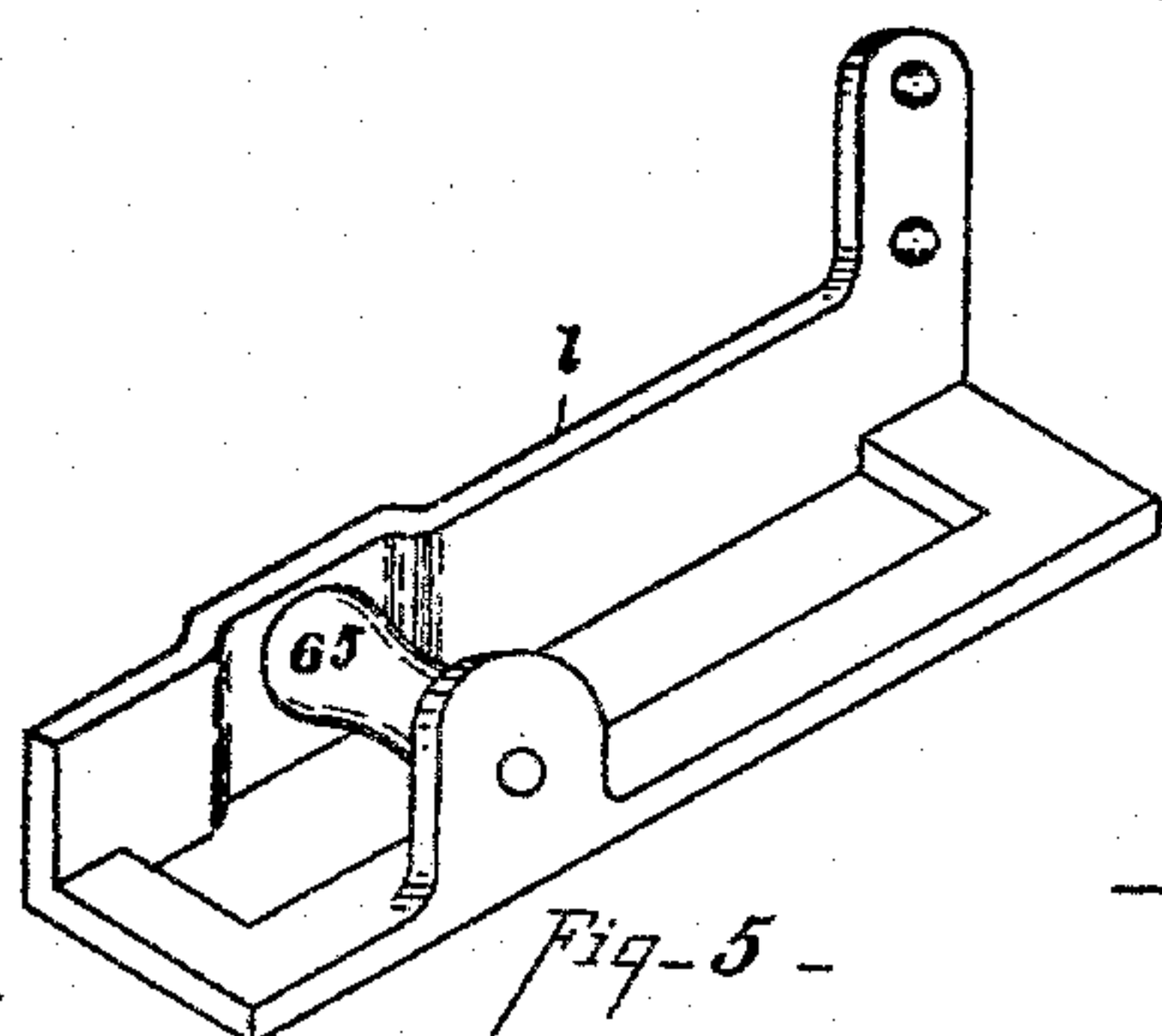


Fig-5 -

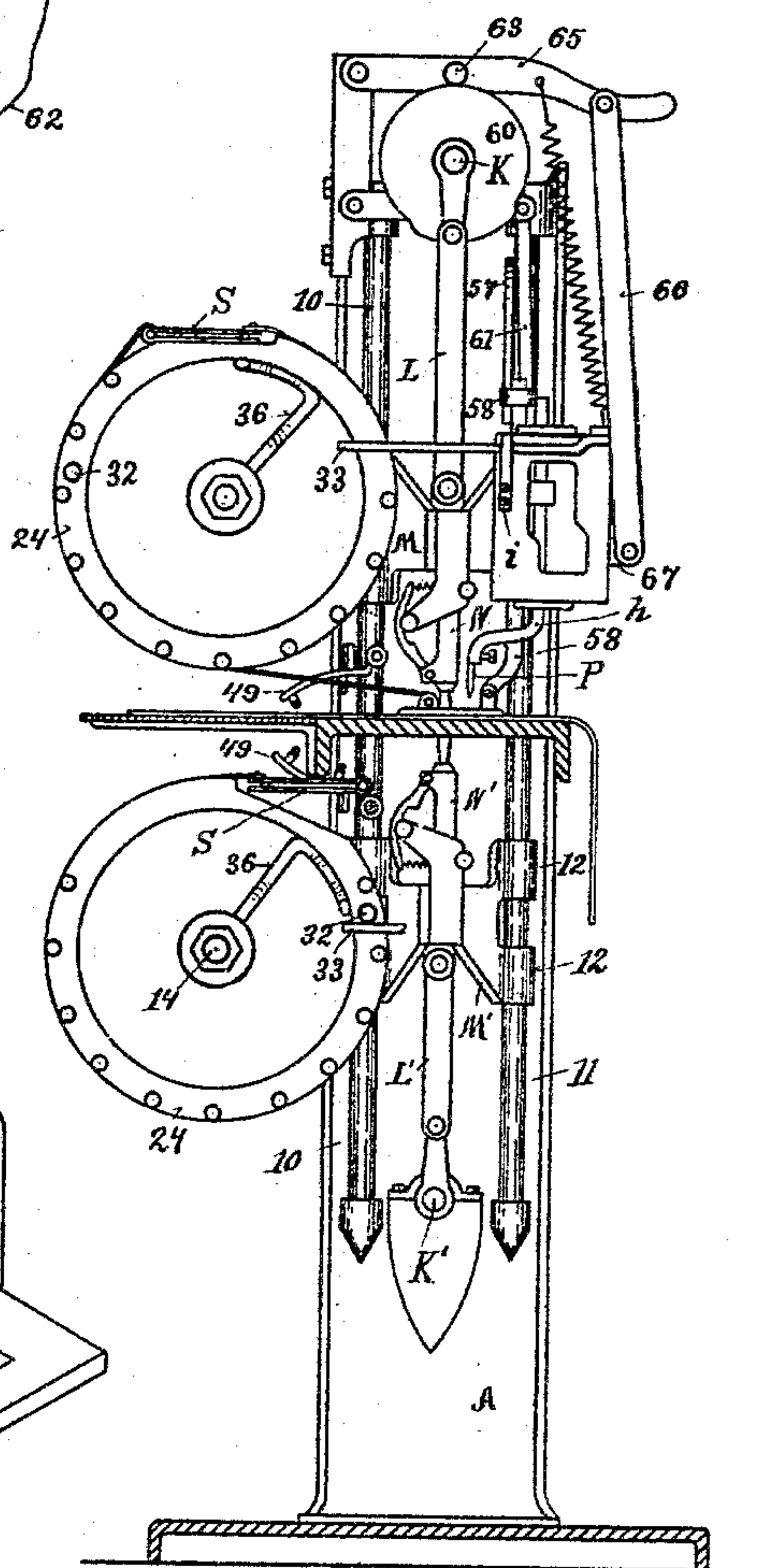


Fig-1 -

Witnesses

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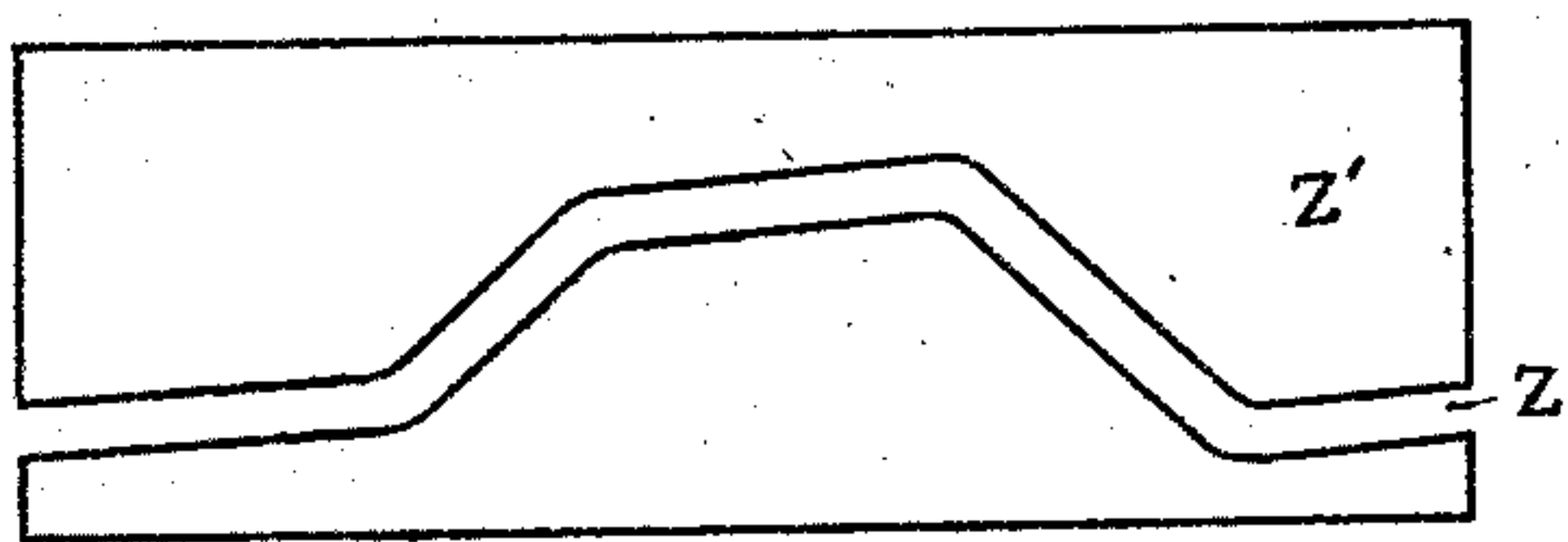


Fig. 9 -

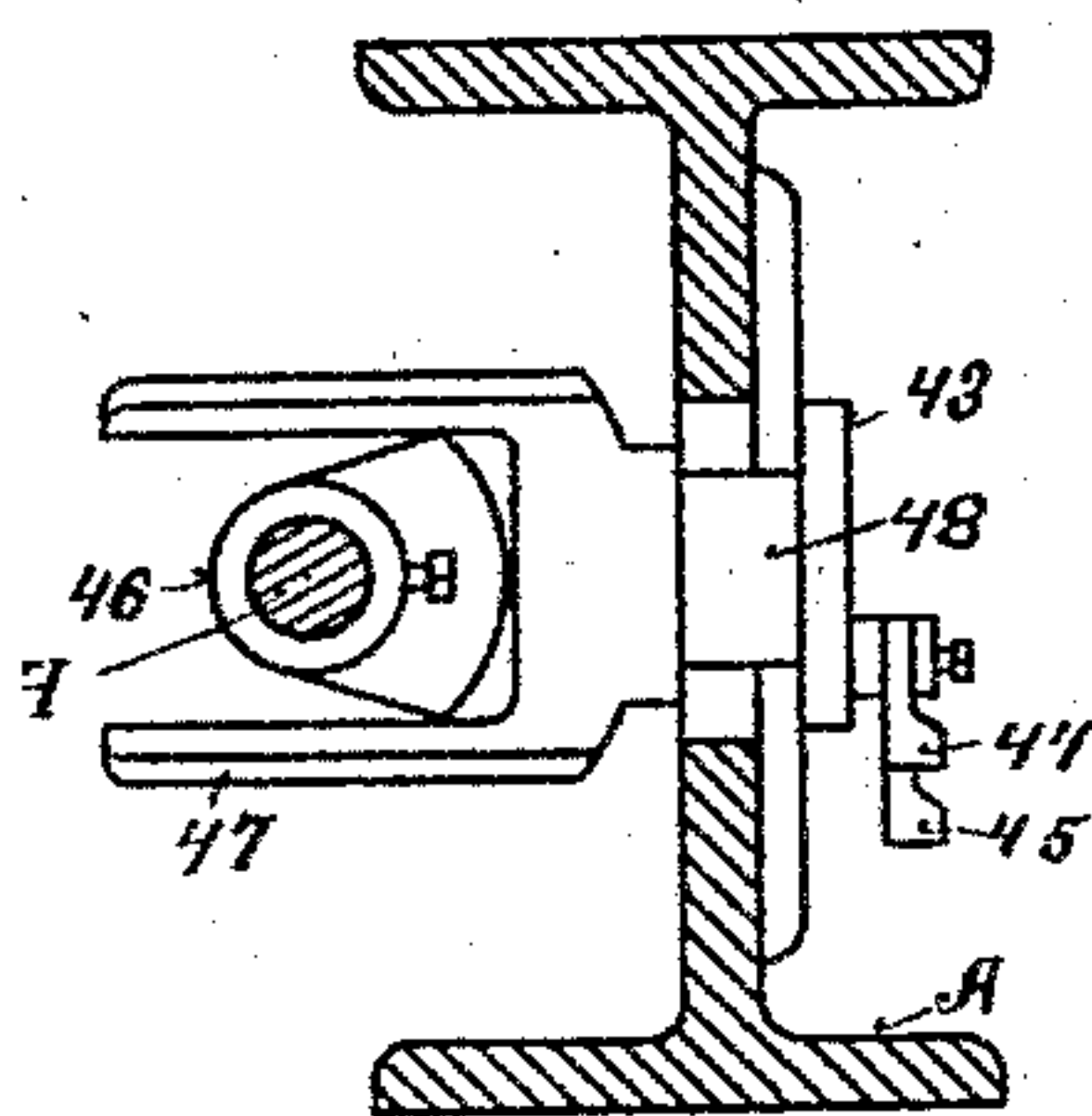


Fig. 10 -

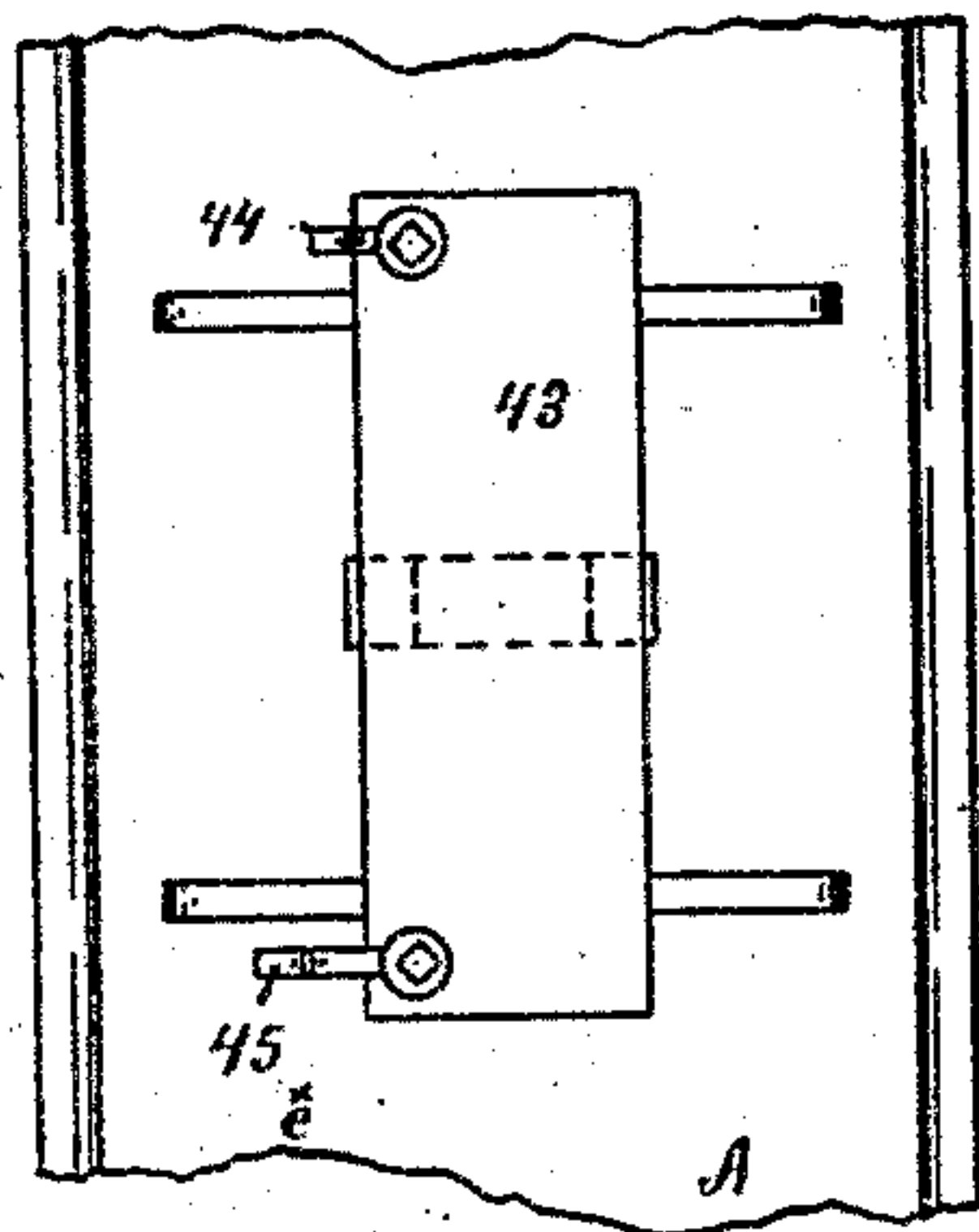


Fig. 11 -

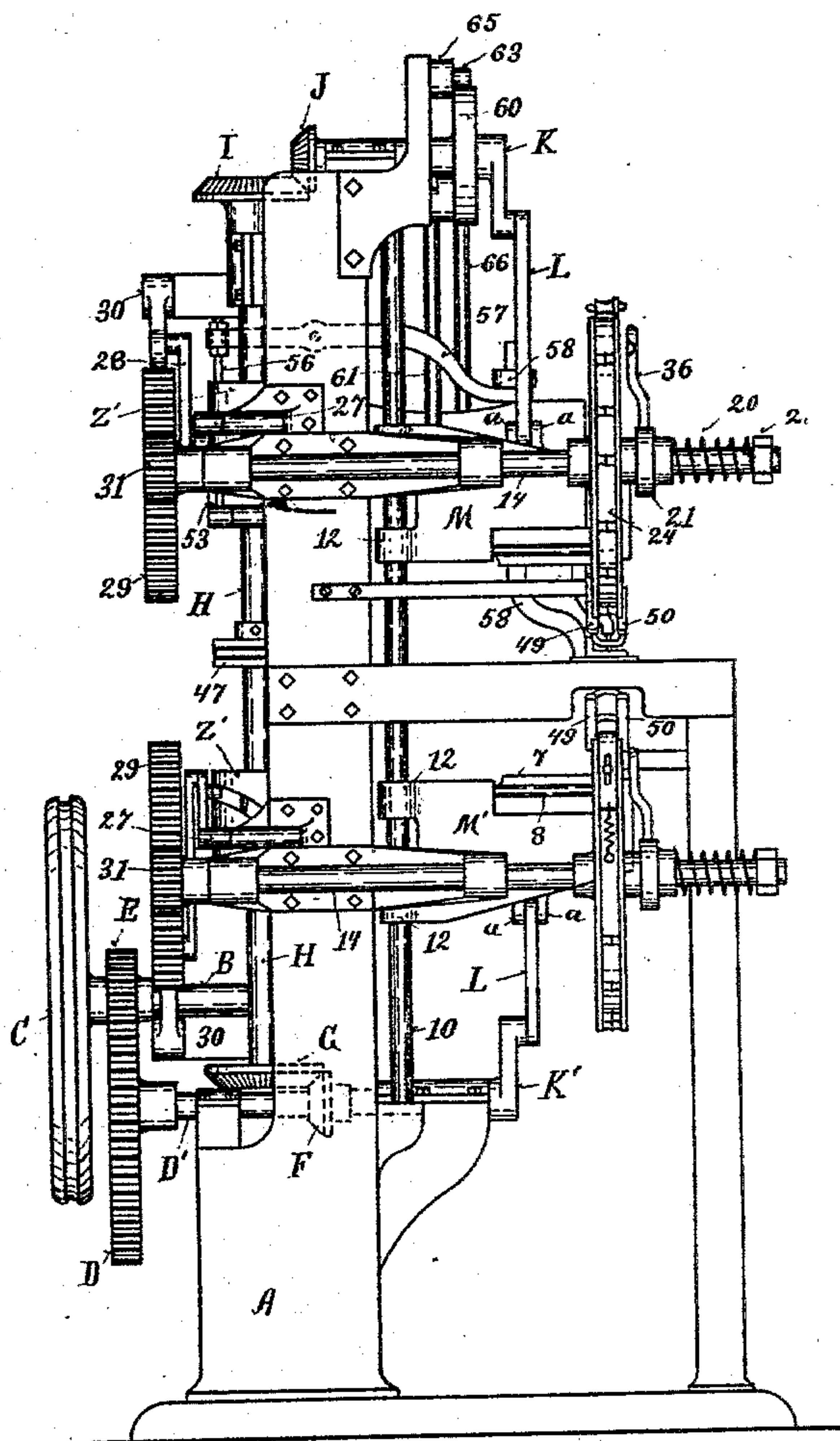


Fig. 2 -

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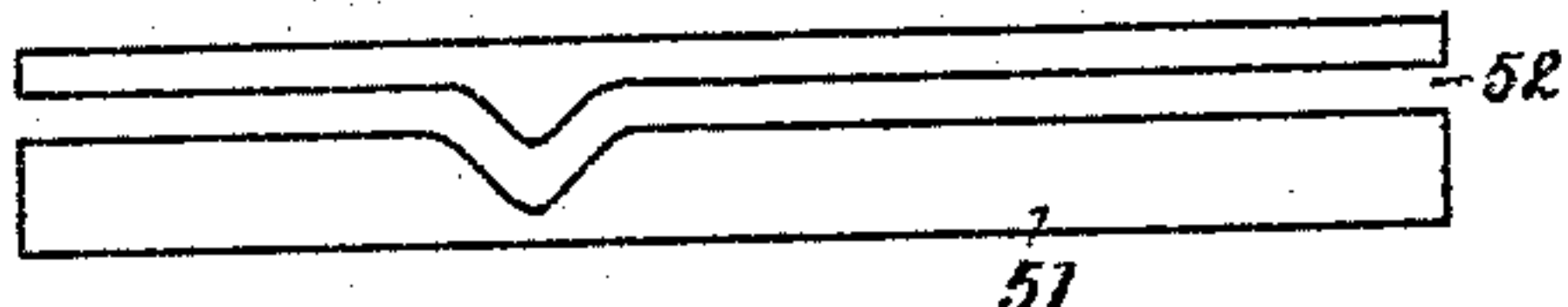


Fig. 6

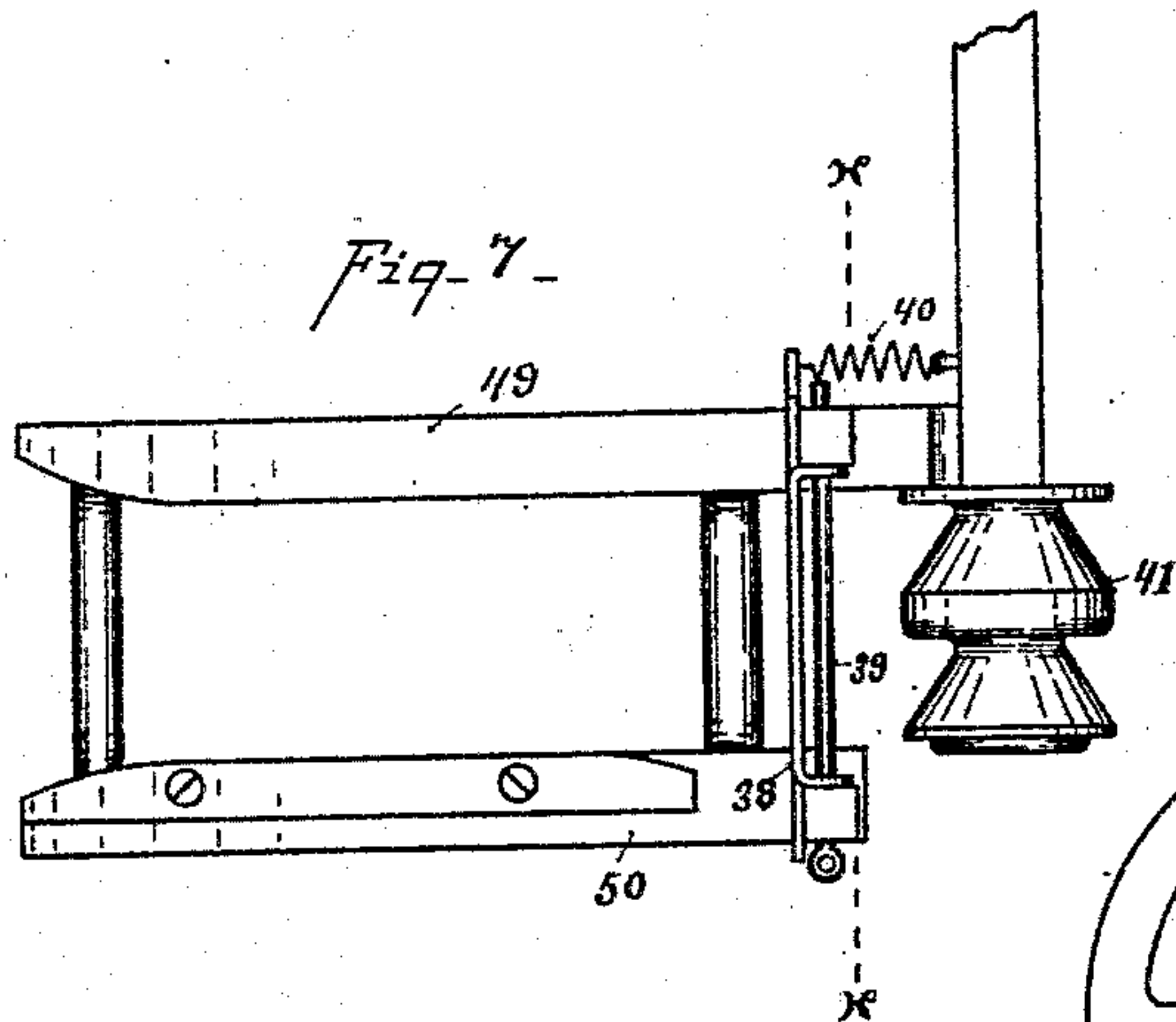


Fig. 7 -

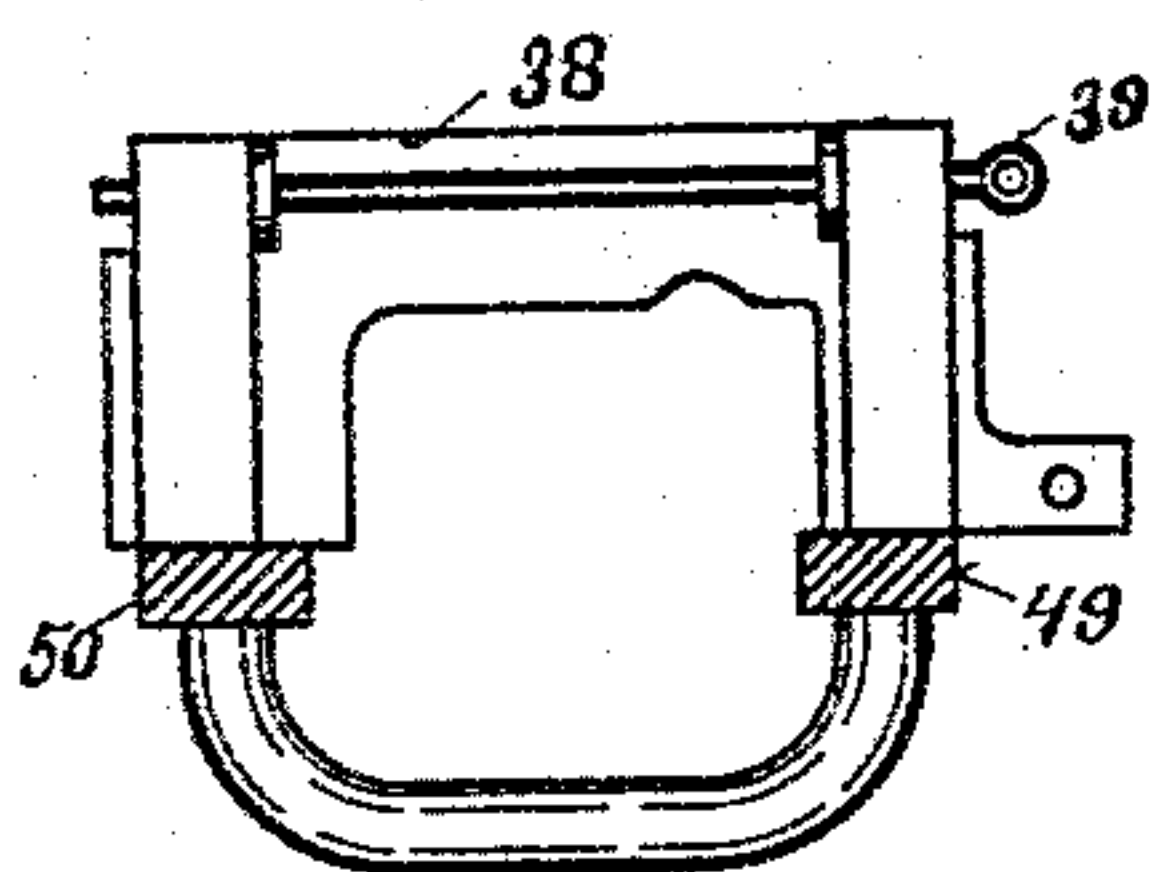


Fig. 8 -

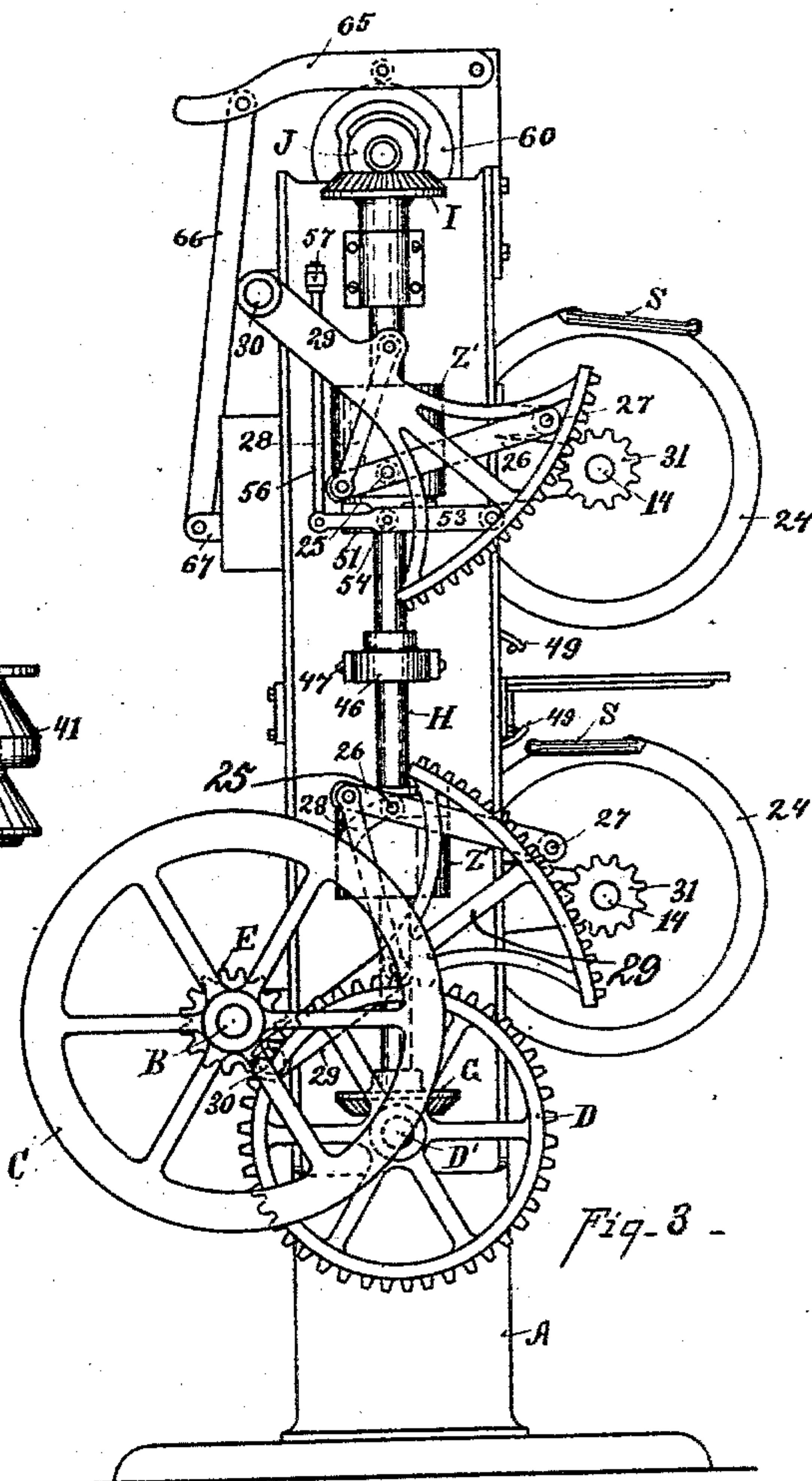


Fig. 3 -

Witnesses

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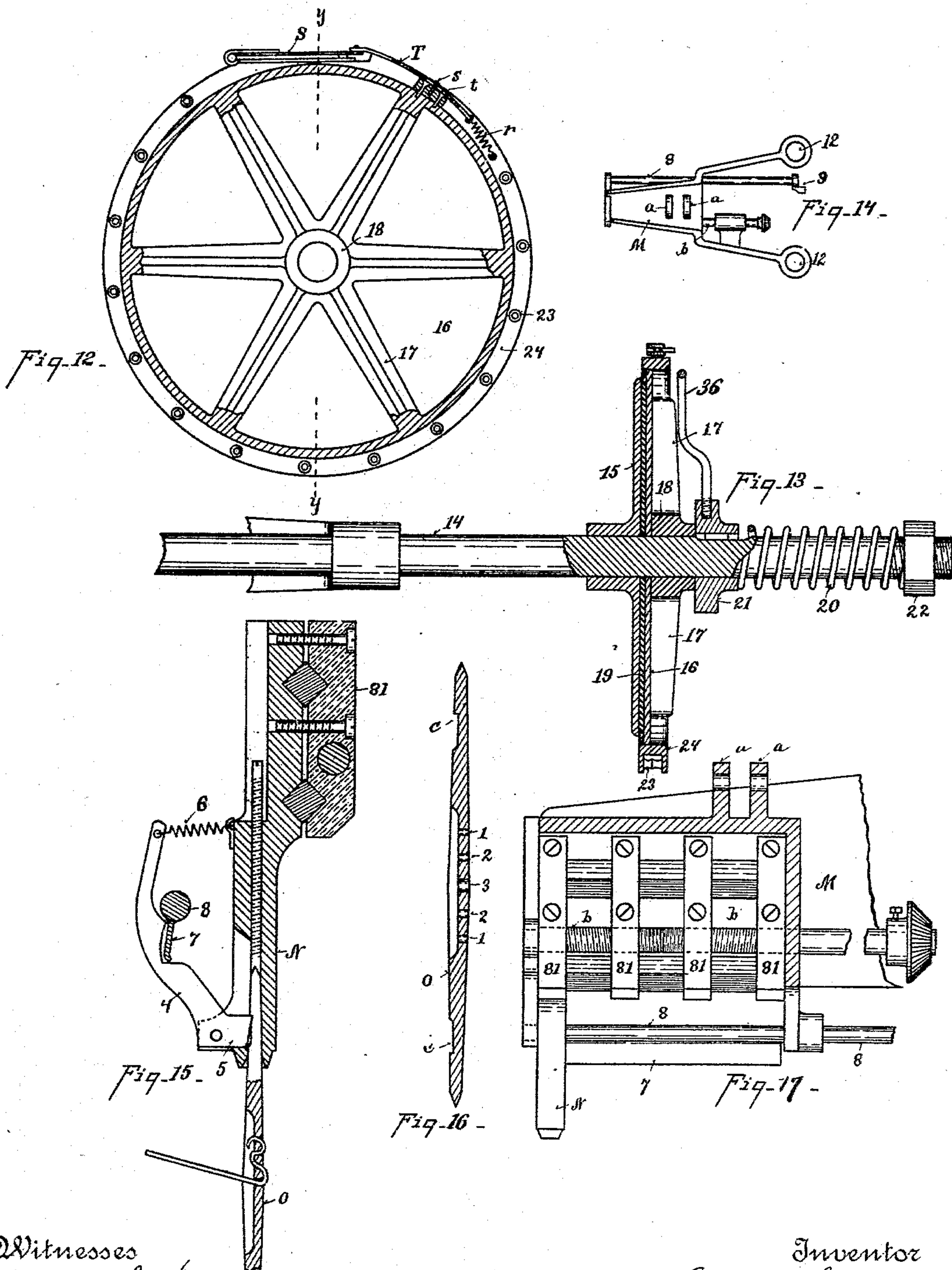
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Witnesses
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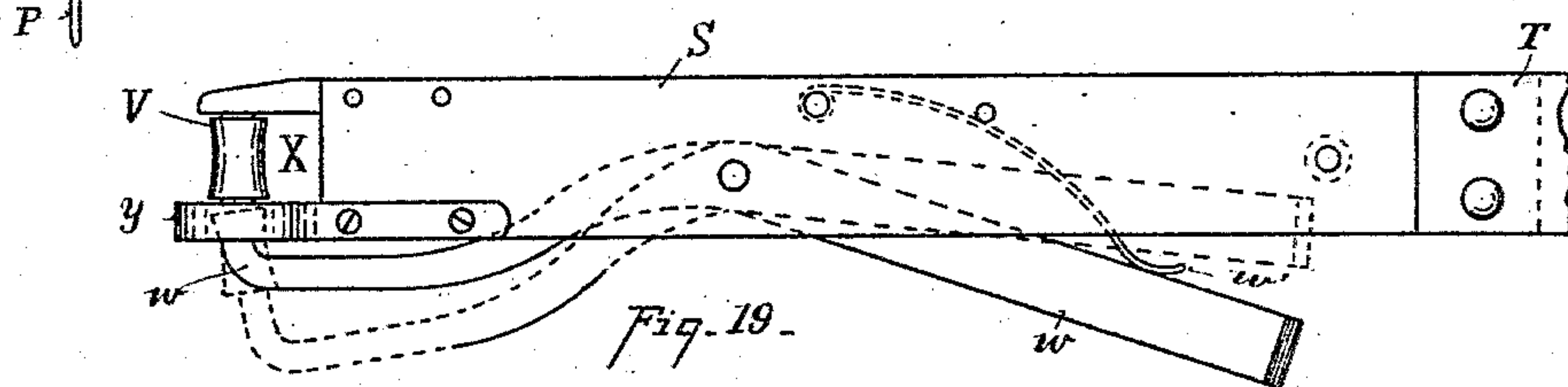
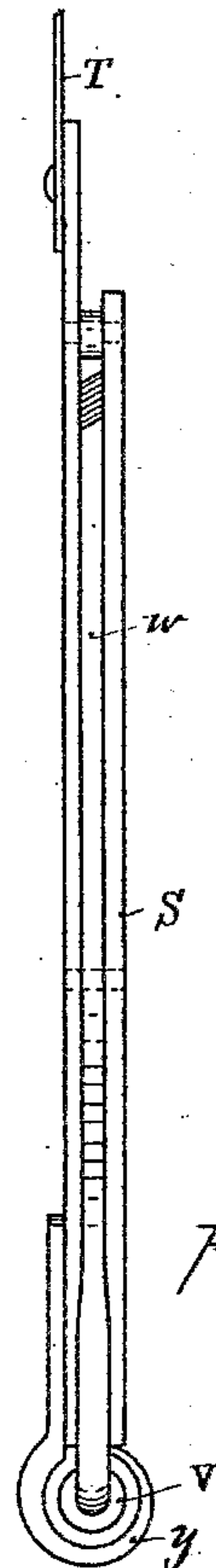
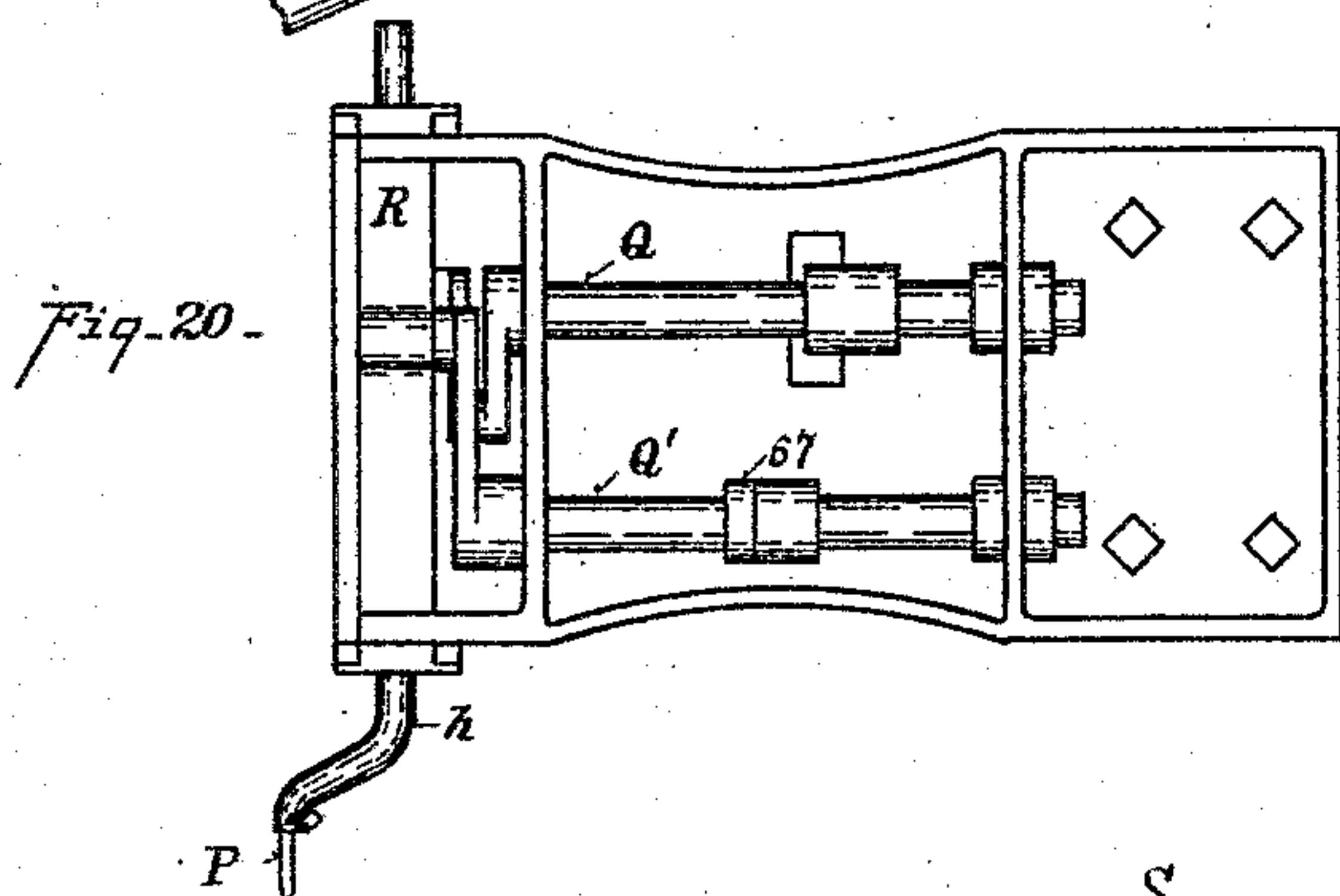
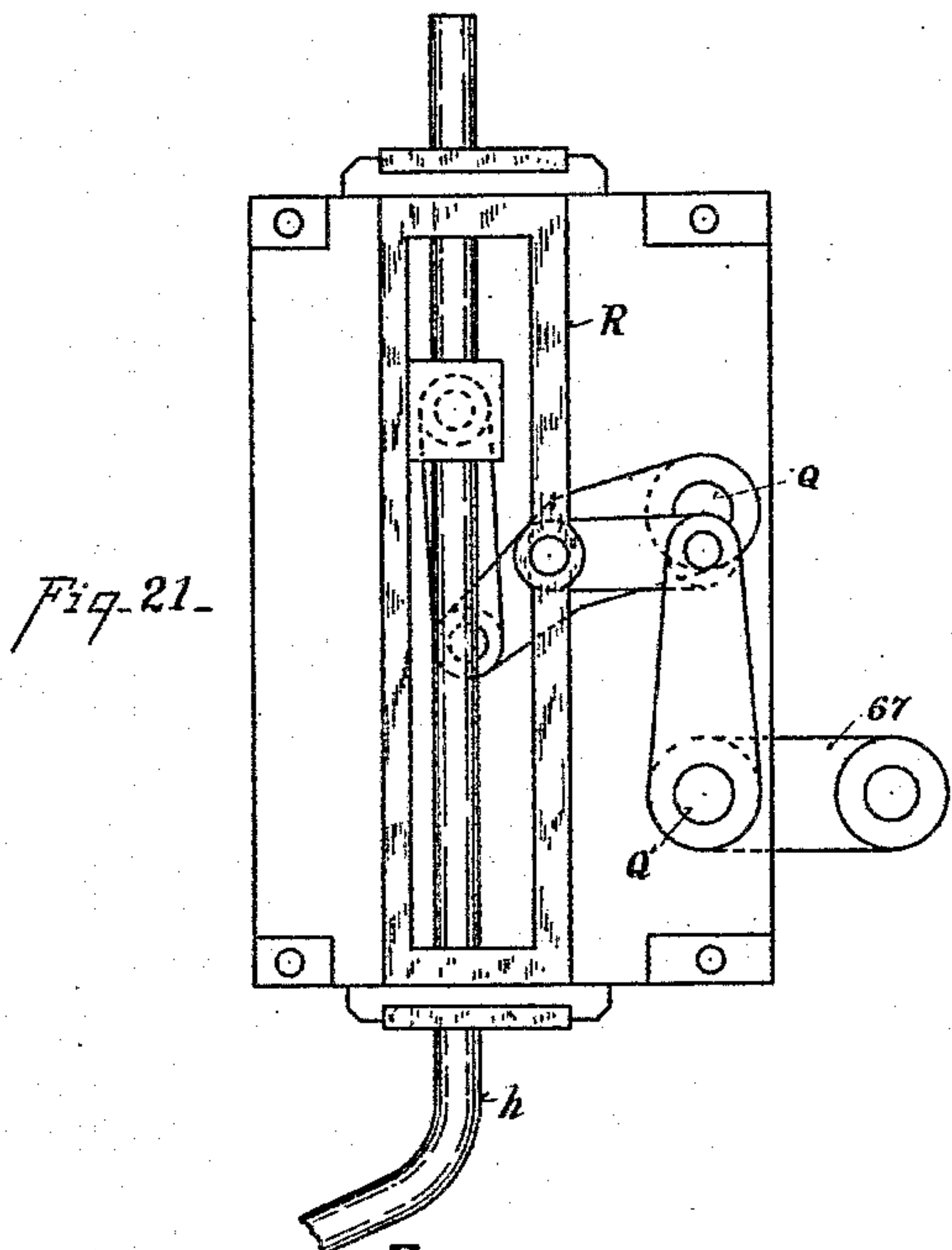
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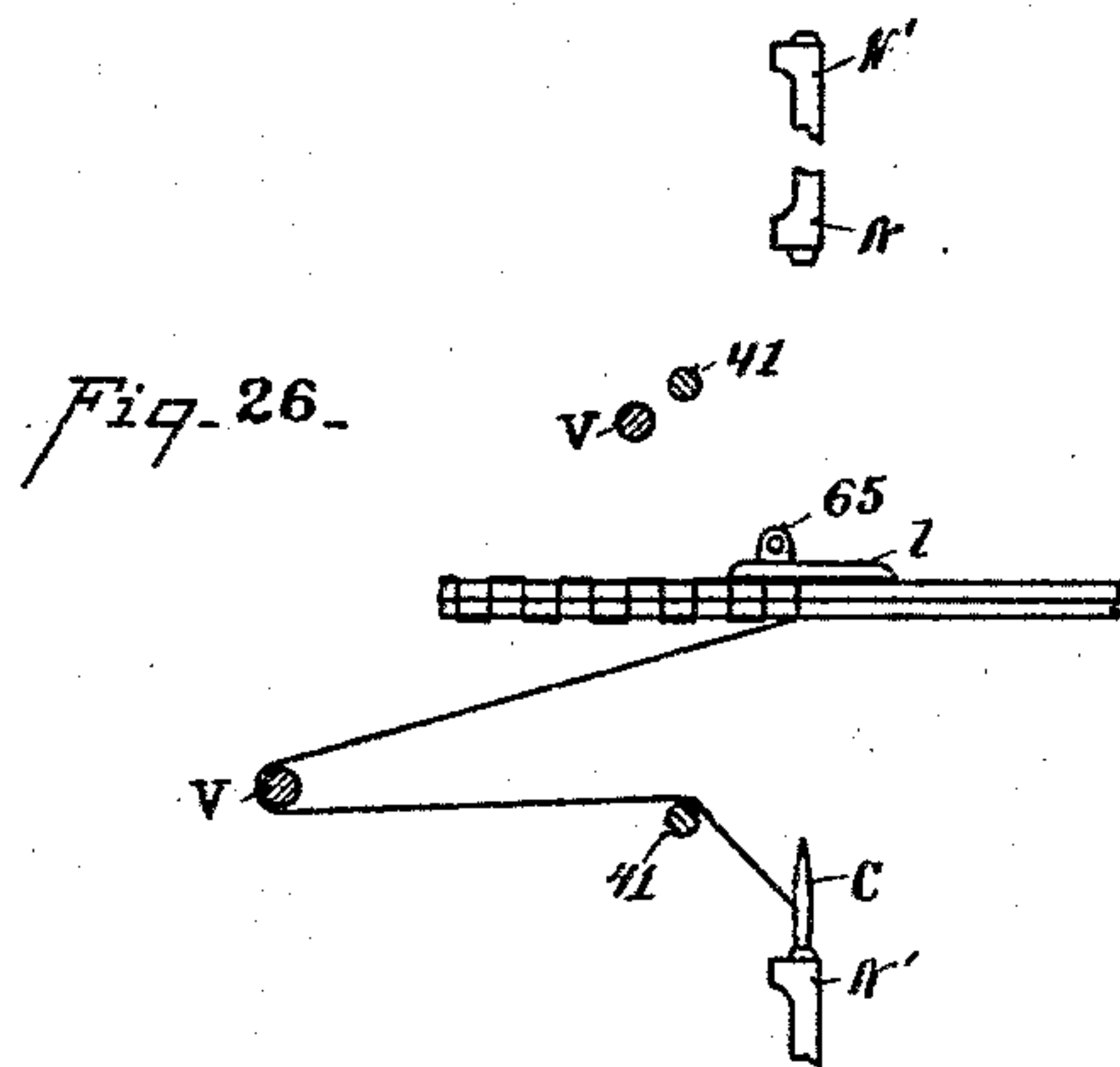
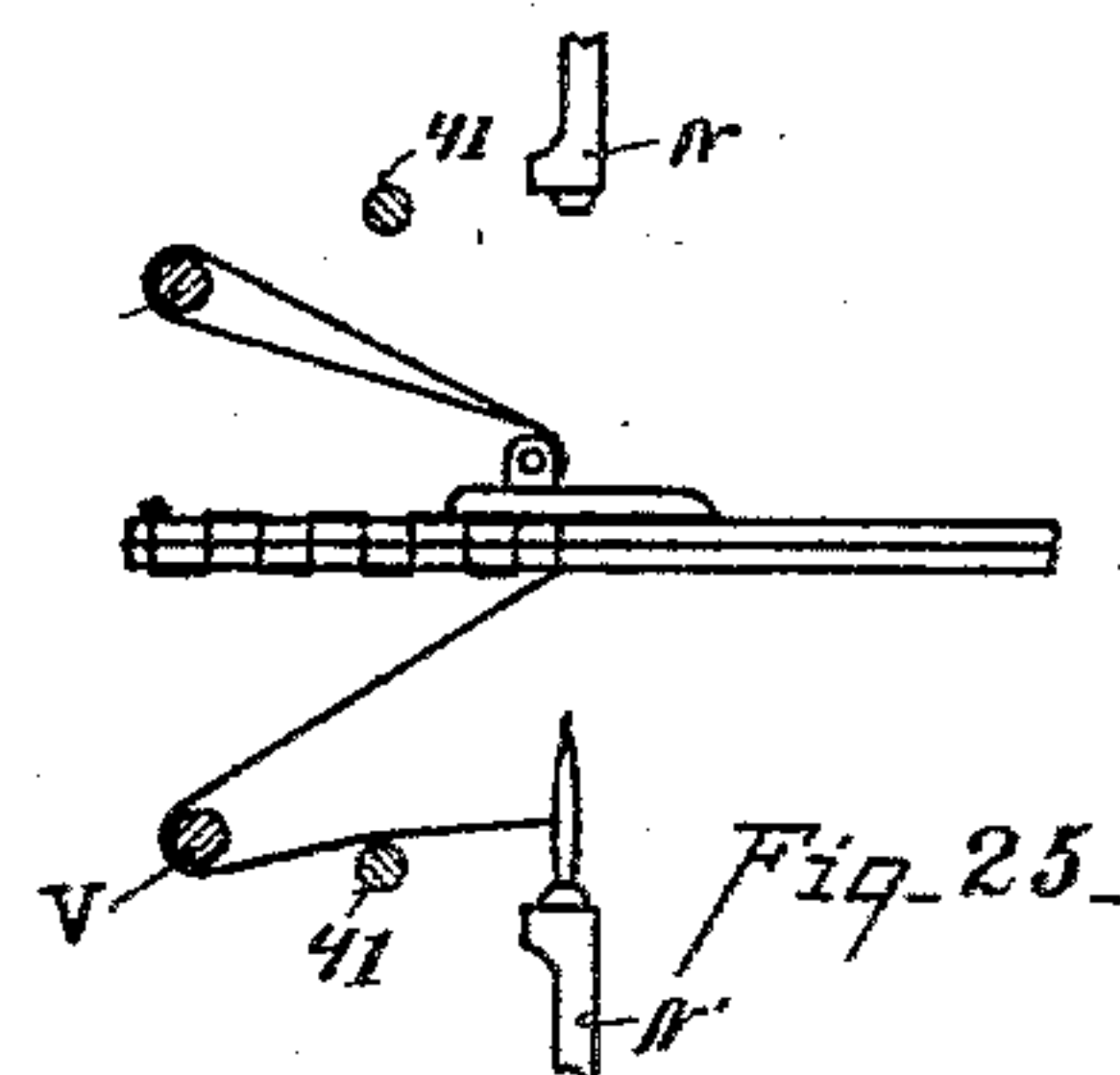
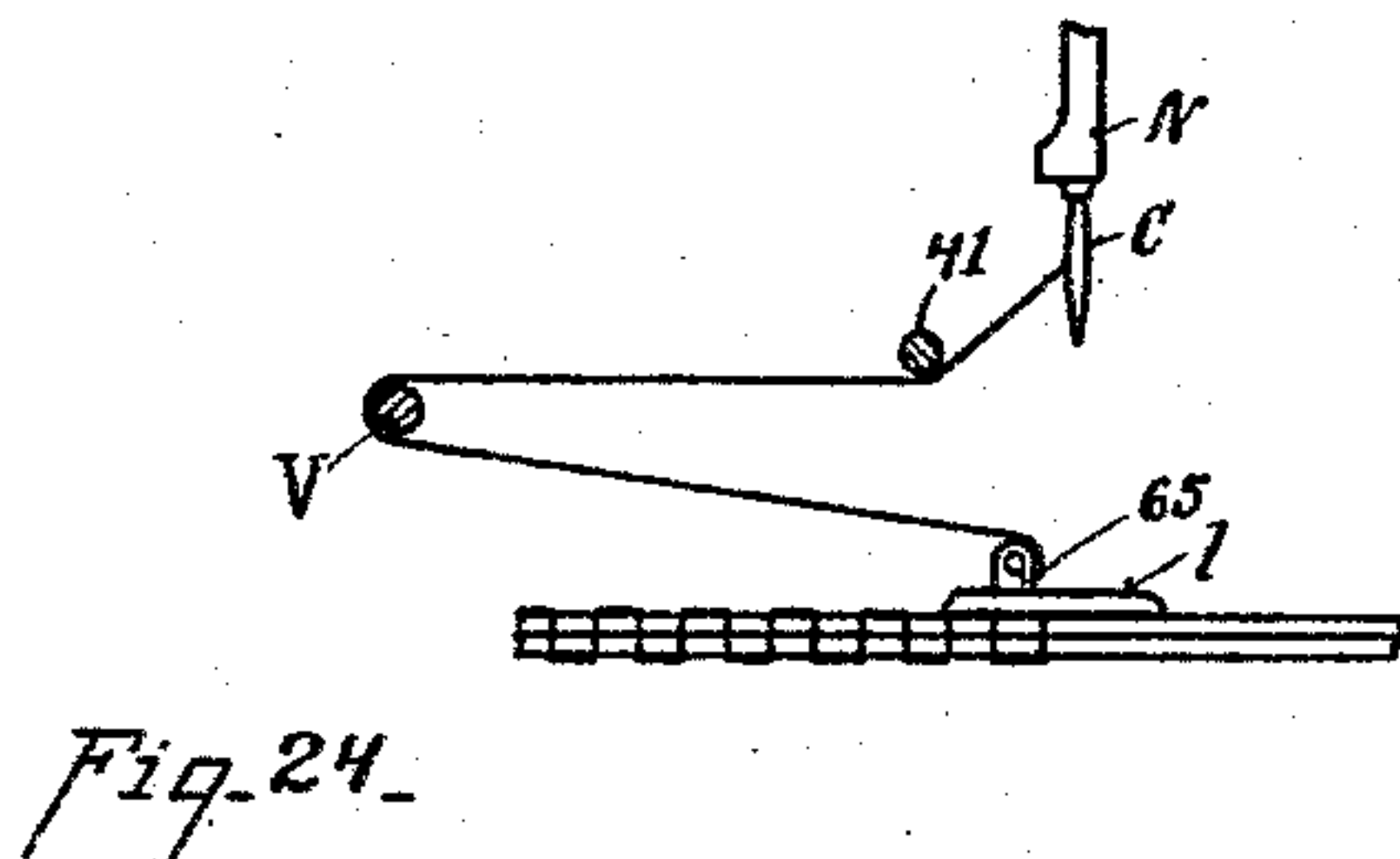
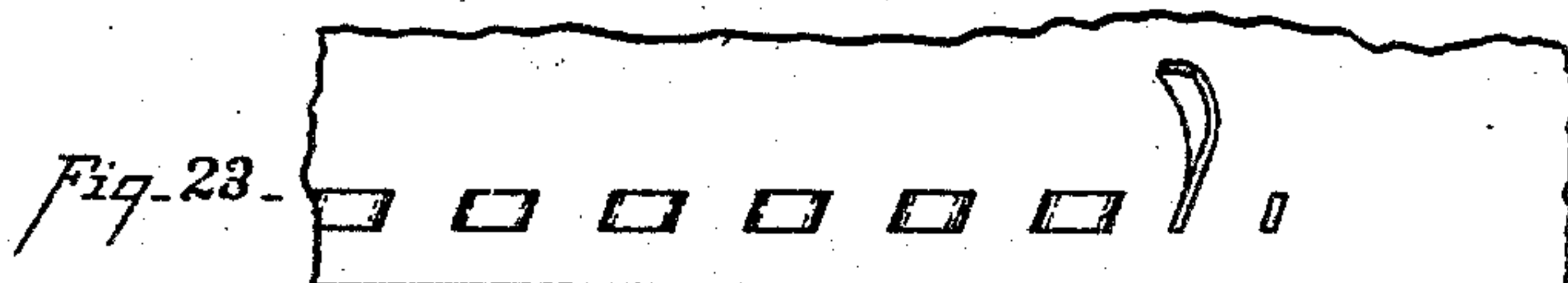
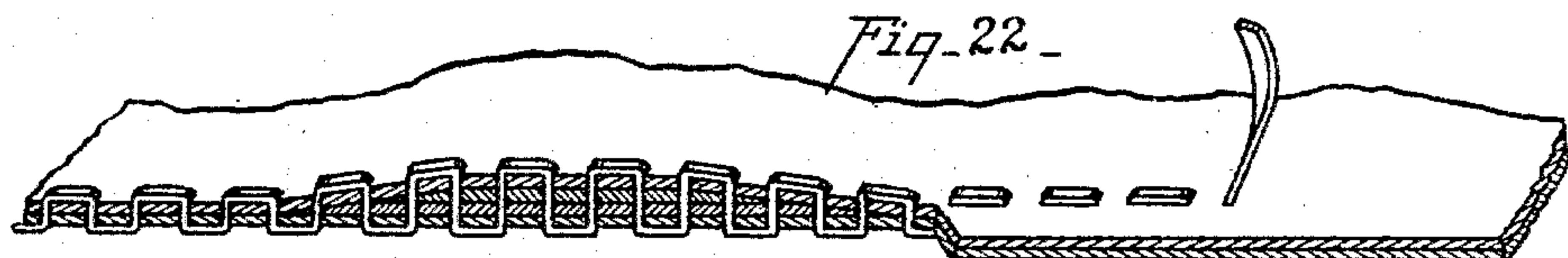
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WITNESSES:

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INVENTOR,

Louis L. Miller
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ATTORNEYS

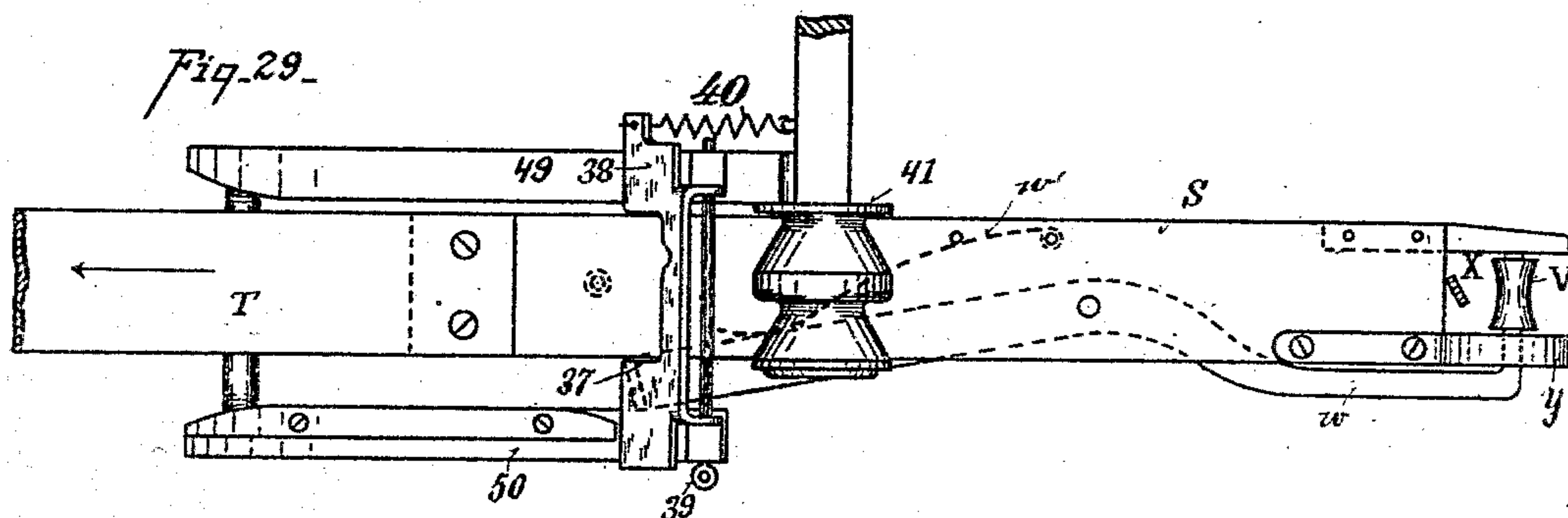
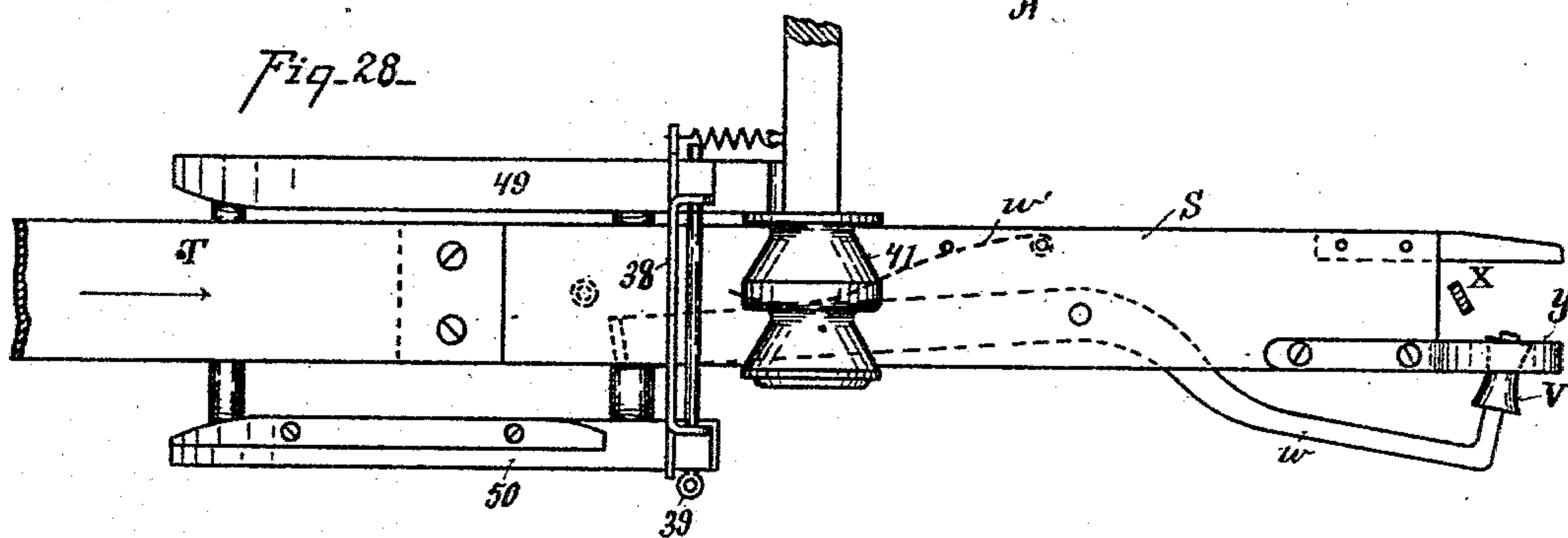
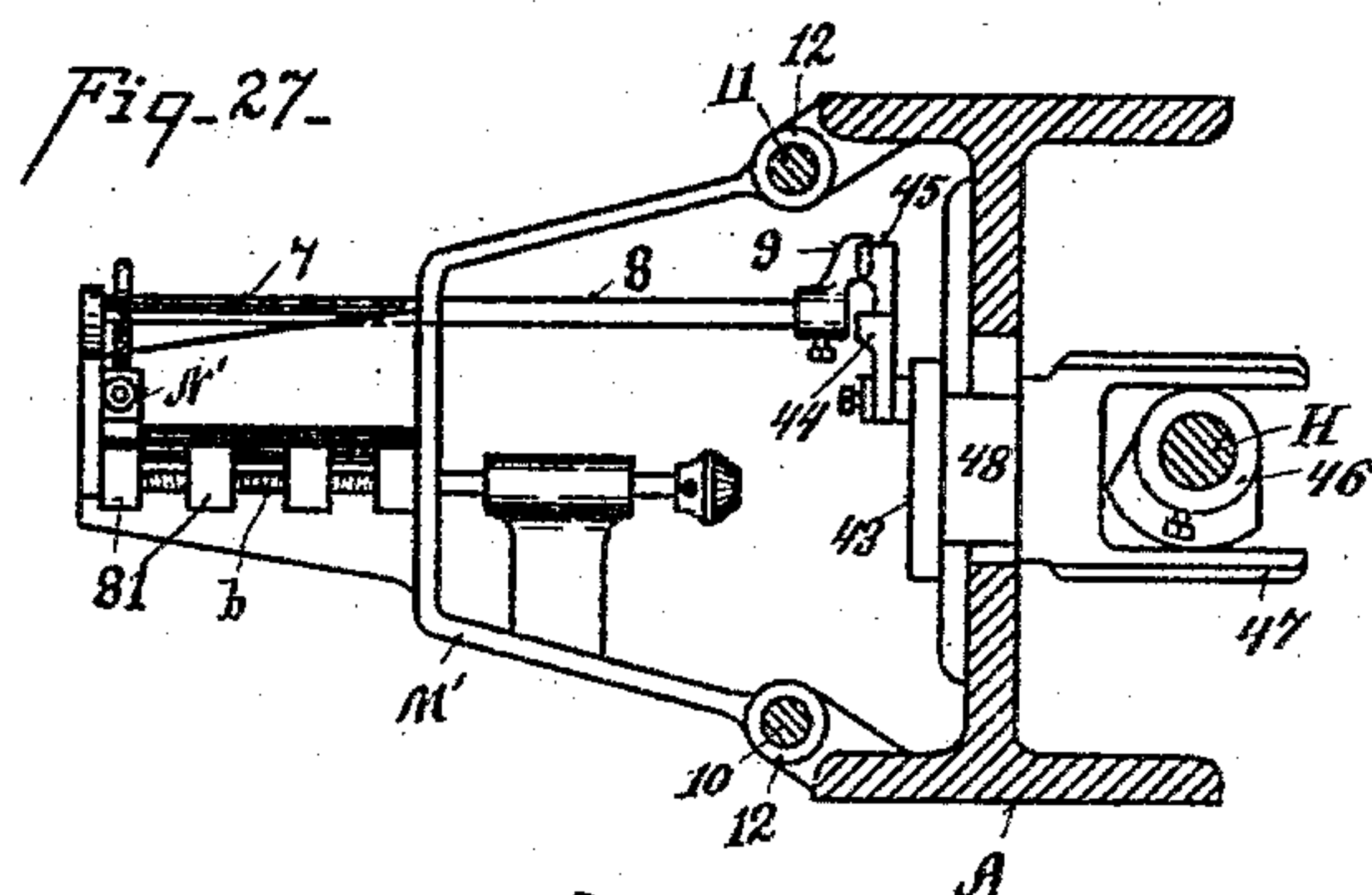
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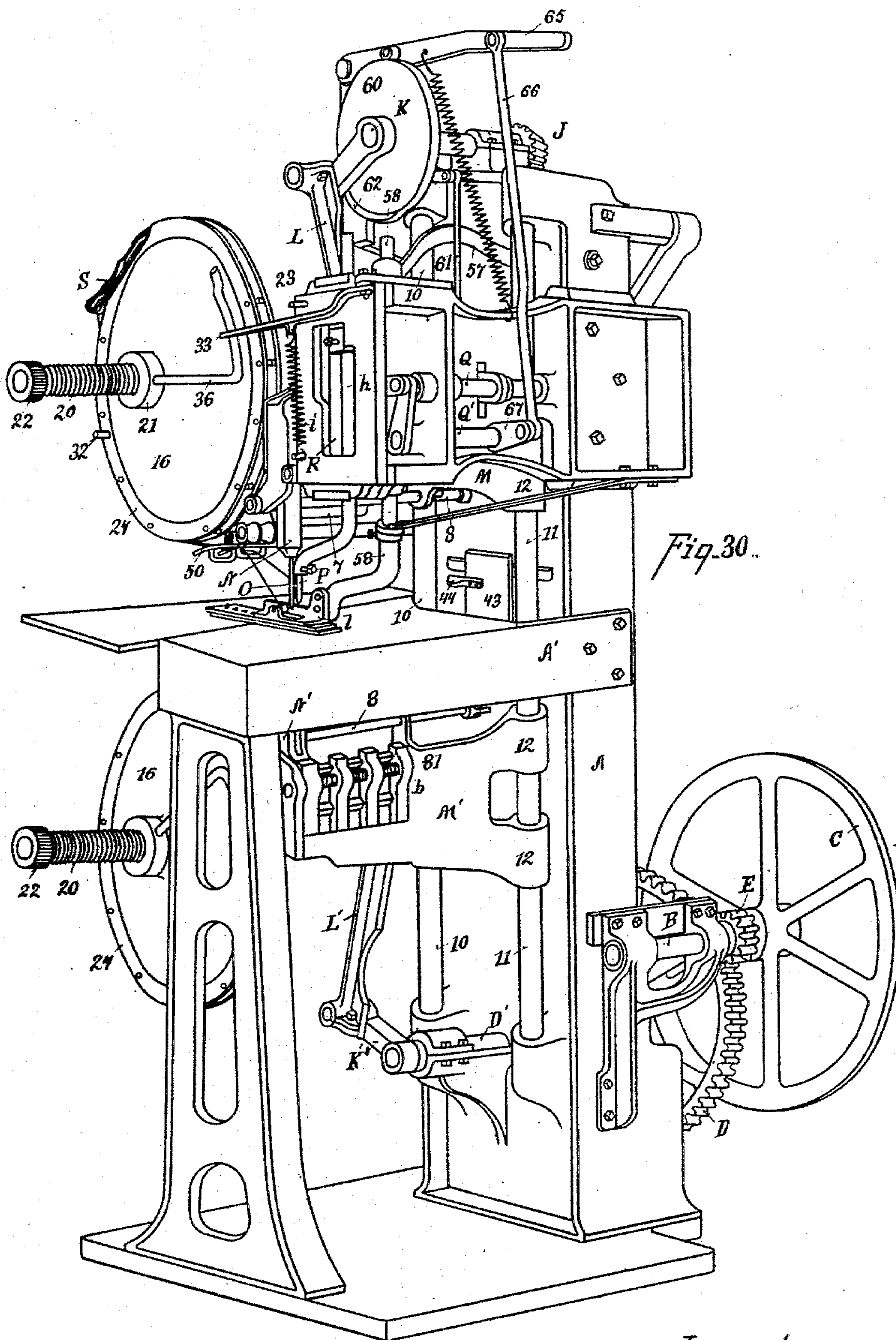
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8 Sheets—Sheet 8..

L. L. MILLER.
SEWING MACHINE.

No. 515,712.

Patented Feb. 27, 1894.



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W. R. Hood—

Inventor—
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UNITED STATES PATENT OFFICE.

LOUIS L. MILLER, OF NEWPORT, KENTUCKY, ASSIGNOR TO THE ROSS-MOYER
MANUFACTURING COMPANY, OF CINCINNATI, OHIO.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 515,712, dated February 27, 1894.

Application filed November 25, 1891. Serial No. 413,088. (No model.)

To all whom it may concern:

Be it known that I, LOUIS L. MILLER, a citizen of the United States, and a resident of Newport, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Sewing-Machines, of which the following is a specification.

My invention relates to a sewing machine adapted to sewing with thongs or thread; it is primarily adapted to sewing horse-collars, and as such it is shown and described.

The object of my invention is first, to operate a double pointed needle with the eye in the middle so that each end of the needle alternately passes through the material and pulls the thong through to sew the material.

Another object of the invention is to provide reciprocating needle bars, one above and one below the table, and so driven that each arm alternately pushes the needle through the goods and releases it just as the opposite arm grasps and pulls it through the goods, and vice versa; the function of the two arms being the same on each alternate stroke.

Another object of my invention is to provide a compensating take-up device which moves far enough to take up the slack in the thread, and the distance of the movement being governed by the length of the thread.

Another object of the invention is to provide this compensating take-up device upon either side of the table working alternately one with the other.

The various features of my invention are fully set forth in the description of the accompanying drawings making a part of this specification, in which—

Figure 1 is a front elevation of my improvement. Fig. 2 is a side elevation. Fig. 3 is a rear elevation. Fig. 4 is a detail view of one of the cams. Fig. 5 is a perspective view of the foot. Fig. 6 is a plan view of the foot cam. Fig. 7 is a detail view of the top of guide and take-up finger trip. Fig. 8 is a section on line x, x , Fig. 7. Fig. 9 is a plan view of one of the take-up cams. Fig. 10 is a detail view of the needle releasing mechanism. Fig. 11 is a front elevation of Fig. 10. Fig. 12 is an elevation partly in section of the take-up reel. Fig. 13 is a section on line y, y , Fig. 12. Fig. 14 is a top plan view of the head carrying the needle. Fig. 15 is a central

vertical section of the needle bar. Fig. 16 is a central vertical section of the needle. Fig. 17 is a side elevation partly in section of the cross head shown in Fig. 14. Fig. 18 is a side elevation of the take-up finger. Fig. 19 is a top plan view of the same. Fig. 20 is a side elevation of the awl and feeding mechanism carrying the same. Fig. 21 is a front elevation of Fig. 20. Fig. 22 is a sectional view of the stitch. Fig. 23 is a top plan view of the same. Figs. 24, 25 and 26 are diagrams illustrating the process of taking the stitch. Fig. 27, is a detail sectional elevation showing the releasing device in position for tripping the upper catch. Fig. 28, is a detail plan view showing the position of the take-up finger and gate in the act of engagement with the thong or thread, and Fig. 29, is a similar view showing the parts in position to pull the thong or thread and take up the slack. Fig. 30 is an enlarged perspective of my improved sewing machine.

A represents the frame of the machine. B the main driving shaft. C the pulley mounted on the end of the same. D a spur wheel on the shaft D' receiving motion from the spur E on the shaft B. F represents a bevel gear on the shaft D' driving bevel gear G on shaft H. I represents a bevel gear on top of shaft H transmitting motion to the bevel gear J, which drives crank arm K.

K' represents a similar crank underneath the table on the shaft D'. Each crank arm alternately advances and draws the needle, the motion being so adjusted in time that the two arms come together, the one to receive the needle from the thrust of the other.

L L' represent links connected to the respective cranks at one end and engaged at the other end with a stud journaled in lugs a, a , on the cross heads M M'.

N represents a needle bar. It is attached to either of the posts Sl , as shown in Figs. 17 and 30, so that more than one needle bar may be used at the same time, if desired. These posts are supported and slide laterally upon bars. A screw shaft b taps through the posts and as it is turned to the right or left they are drawn together or forced apart to shift their position. It will be observed that the central portion of the threads are only one-half of the pitch of the outer portions, be-

cause in turning the screw-shaft the two inner or central posts move together and consequently only have to move one-half as far as the outside posts in order to make the same space adjustment. The needle bar is shown attached to only one of these posts; it is evident that the operation of all will be the same so far as sewing.

O represents the needle; it is pointed at both ends.

c Fig. 16 represents recesses or notches near the opposite ends of the needle by means of which recess the needle is engaged with the needle bar.

1, 2, 3, represent a series of holes pierced through the needle, as shown in Fig. 16, for holding one end of the thong or thread firmly in the needle during the operation of sewing. By passing the thread through three or more of these holes, as seen in Fig. 15, knotting the end of the thread is obviated.

5 represents a catch passing through a slot in the needle bar N or N'. This catch 5 is formed on the lower end of a shank 4 which is pivotally supported on a projecting portion of the needle bar in position to allow the catch to pass through the slot in said bar and engage a recess c formed in the needle as shown in Fig. 15, said catch being normally held in engagement with the needle by means of a spring 6 having one end attached to the needle bar and the other connected to the free end of said shank.

7 represents a tripping arm carried by shaft 8 which is tripped by the engagement of the lug 9 with a lug 45 hereinafter described in proper time movements to release the needle.

The cross head M above the table is driven by the crank K and the cross head M' on the lower side of the table is driven by crank K'. It is preferred to have guide rods 10, 11 on each side of the frame of the machine, as shown in Fig. 1, for these heads to move upon. 12 represent ears pierced to slide on said guide rods; these are made heavy and duplicated so as to obviate jars, and prevent lost motion. In Fig. 1 these two heads carry the respective needle bars N, N' and are in the position of nearest approach to each other, in which position the catch 5 of one needle bar, as N, is tripped just as said needle-bar delivers the needle to the opposite needle-bar, as N', whereupon the catch of said last named needle-bar becomes engaged in the opposite recess of the needle. Then as the heads M and M' are recessed from each other, driven by the crank motion, one needle bar pulls the needle through the goods, and the other needle bar returns idle; so that one of the needle bars is carrying the needle while the other is running idle. In the next alternate motion the function is reversed, the opposite needle bar carries the needle and the former needle bar becomes idle.

P represents an awl, see Fig. 20, which is driven by the crank shaft Q, while the shaft Q' moves the slide R in which the awl bar h

is mounted for effecting the feed. It operates exactly as the needle and feeding mechanism shown in Letters Patent No. 424,490, granted me April 1, 1890, and need not be fully described herein.

This machine sews with a thong or thread of pre-determined length, having one end attached to the needle, as shown in Fig. 15, the other end being the commencement of the line of stitches as shown in Fig. 25. It is necessary to take up the slack nearly equal to the entire length of the thread for the first stitch, and as the thong is stitched the slack progressively shortens with each stitch, so that the take-up device must correspondingly shorten its travel. I prefer to accomplish this by the following instrumentalities, and by an oscillating motion, though a reciprocating device might be substituted therefor. These take ups are the same above and below the table except they move in reverse directions.

14, 14, Figs. 1, 2 and 3 represent two shafts each carrying a friction disk 15, Fig. 13, which is secured thereon, each of the said shafts being rotated by cams in appropriate time movements. 16 represents a disk arranged to oscillate on the shaft 14 and strengthened by arms 17 springing from a hub 18.

19 represents a friction disk preferably made of leather and secured to the disk 15 against which the disk 16 bears.

20 represents a spiral spring seating against the collar 21, which is thus held in frictional contact with the hub 18.

22 represents a nut against which the spring 20 seats, which nut is turned to adjust the tension of the spring to regulate the friction of the take up device, and consequently the tension of the thong.

23 represents a series of spools journaled in the rim 24 which is recessed or grooved, as shown in Fig. 13; this series of spools is arranged around the periphery of the take-up disk 16 forming a reel over which the thread or thong is drawn by the take up finger.

S Figs. 12, 18, 19, 28, and 29 represents a take-up finger which is supported on the reel. It is attached to the flexible spring arm T, which is held to the reel by the stud s.

t represents a slot pierced through the spring arm T to allow the same to slide on the stud s.

r Fig. 12 represents a spring one end of which is attached to the reel, and the other to the friction arm T, so as to cushion the stopping and starting of the take-up finger, to obviate jerks and prevent breaking the thong.

V represents a friction roller in the foot of the take-up finger S which is normally held in the position shown in full line in Fig. 19; it is journaled on the tripping arm w and is drawn through the loop of the jaw y as shown in dotted lines Fig. 19, to allow the thread to pass into the recess X and engage said roller V, thus enabling the finger S to take up the

slack of the thong. The finger is retracted and advanced by the oscillation of the shaft 14 on which is journaled the friction reel.

It will be observed that the devices above and below the table are each the counterpart of the other, and moving in reverse directions so that one is taking up slack while the other is delivering it; that is, one alternately takes up the slack, say above the table, and the one below the table takes up the slack as the one above the table is releasing the slack. This is done by the oscillation of the reel and the devices carried thereon. This oscillating motion is produced by means of cams Z, as shown in plan Fig. 9, which are formed in the periphery of the cylinder Z'.

26 represents an arm carrying friction roller 25 which travels in groove Z; said arm 26 is journaled at 27 to the frame of the machine.

28 represents a link journaled to the arm 26 and to the quadrant arm 29, one end of which quadrant arm journals on the center 30, the opposite end of which is a segmental gear driving the pinion 31, mounted on the shaft 14 so as to oscillate the disk 15 and the reel 16. The gear of the pinion 31 is such that the disk 15 oscillates once each sweep of the segment.

32 represents a lug projecting out from the side of the rim 24 which engages with the stop finger 33 to arrest the oscillation of the rim. In Fig. 1 the lower one of these is shown in engagement with said finger 33.

It will be observed that the shaft 14 is rotated positively by the cam Z and that the disk 15 and the collar 21 move uniformly with the shaft while the disk 16 carrying rim 24 being only in frictional contact with the shaft will stop in its rotation whenever the slack in the thread or thong has been taken up, so that while the oscillating movement of the shaft will be positively determined by the cam Z which moves a distance sufficient to take up the greatest amount of slack of the thong, yet the frictional connection of the take-up device will stop its revolution whenever the slack has been taken up. The take-up finger S is arrested in its forward movement by the lug 32 so that it is held in position, as shown in Fig. 1, below the table but it is advanced and held there until the needle has been pulled down by the needle bar M', when the tripping arm 36 traveling positively with the shaft 14 advances and moves the finger 33 out of contact with the lug 32; said finger moving horizontally out from the rim 24. The stop finger 33 is brought back into position as soon as the tripping finger has passed below it by the retractile spring i. During this movement the take up finger S has advanced sufficient to engage with the thread; this engagement is accomplished by the withdrawal of the friction roller V passing through the jaw y, so that the thread passes into the space X, as illustrated in Fig. 28, the arm w moves past the gate 38 and

spring w' returns the roller V into position; said gate 38 is hung on the rod 39 and is moved upward on its forward movement by the end of arm w striking it, which raises the gate 38 without tripping the arm w. The position of these parts while the gate 38 is being raised on the forward movement of the take-up is illustrated in Fig. 29. Said gate is returned to its position by the spring 40.

41 represents a guide which is preferably a friction roller. The face of this friction roller is made inclined so as to support the thong which is drawn out double, as illustrated in the diagrams 24, 25 and 26. The return movement of the take up finger S, actuated by its frictional reel 16, releases the thread or thong by the movement of the arm w in the same manner that it is opened to engage the thread or thong, the arm w being actuated by spring w'.

The releasing device on either side of the table, is preferably made as follows: 43 represents, see Figs. 10 and 11, a reciprocating slide carrying tripping lugs 44, 45; lug 44 trips the catch of the upper needle bar, and lug 45 trips the catch of the lower needle bar; this slide is reciprocated by means of the cam 46 on shaft H engaging with the fork 47 of the shank 48 on which is mounted the said slide 43. The said slide 43 moves over until the lug 45 has passed the point e^x; when the lug 44 will engage with the lug 9 on shaft 8 journaled on the upper cross head 10, and when the cam 46 has moved the slide 43 back to the opposite end of its stroke, the lug 45 is in position to engage with a similar tripping lug 9 below the table and releases the needle from the lower needle bar M' as illustrated in Fig. 27.

In order to insure an accurate engagement of the take-up finger with the thong or thread, I provide guides 49, 50, for said finger S to pass through. The guides 49 and 50 are preferably attached to the guide rod 10 as shown in Fig. 1. On these guides 49 and 50 as shown in Fig. 7, is supported the guide roller 41 and the rod 39 on which the tripping gate 38 is mounted.

In order to lift the foot while feeding the material, I provide the following devices:

51 represents a cylinder mounted on the shaft below the cam Z provided with the cam groove 52.

53 represents an arm journaled to the frame of the machine carrying a friction roller 54 which travels in said cam.

56 represents a rod engaging with the lifting arm 57 upon the forward end of which is mounted the foot bar 58, to the lower end of which the foot l is secured, so that the foot may be raised automatically while feeding the goods forward. The awl is operated by a cam 59 which is provided in the rear of cam disk 60, which is mounted on the crank shaft K; said cam drives the rock shaft Q by means of link 61.

62 represents a cam on the periphery of the disk 60; 63 a friction roller engaging there-

with; it is mounted on the lever 65 and operates the link 66, engaging with crank arm 67 which is keyed to the rock shaft Q' to drive the feed slide R. The feed is adjusted so as to move the goods by a thrust of the awl just after the needle has passed through, both in its upward and downward movement, and the awl driving mechanism is adjusted so as to thrust the awl through the goods just as the feeding motion is made. The table is slotted so as to allow the awl to move forward in the slot in the act of feeding.

The mode of operation is as follows: In making the stitch: The several operative devices are geared to work in time movements as follows: Crank shafts K K' revolve two revolutions to one of shaft H. Cams Z on shaft H drive the quadrant arms 29, each one double stroke, that is, a forward and backward movement to one revolution of said shaft H. The reel or take-up movements of shafts 14 are adjusted so that the respective reels make a forward and a backward movement while the needle bar has made one double movement, and they are so adjusted that they take up slack of the thong on each alternate forward movement, one delivering as the opposite one takes it up on each alternate backward movement. The thong or string has two ends, one of which is knotted and the other engaged with the needle as shown in Fig. 15. The needle is inserted into one of the needle bars, say N, and the thong is drawn out in line with the guide, or in line with the path of the take-up finger. The machine is started and the needle passes down through the goods by the advancement of the needle bar N; the trip 5 releases the needle as the needle bar N' engages it, the lower take-up finger is retracted by the backward movement of the shaft 14, said finger passes between the guides 49, 50, under the tripping gate 38; the arm *w* moves inward as shown in dotted lines, Fig. 19, opening the space X. The finger S now remains idle by reason of the stop 32 until the proper time arrives to grasp the thread or thong when it is released by trip 36 and travels in to receive the thong in the space X and then continues its inward movement until the outer end of the arm *w* is free from the gate 38 when the roller V springs to position and the finger begins its forward movement. The end of the arm *w* in traveling forward forces the gate 38 open and passes through without releasing the thong. The reel continues to travel forward until all the slack has been taken up and the stitch pulled tight and then the reel 16 slips on the friction disk 15 for the remainder of the forward movement of the shaft 14. The awl punctures and feeds the goods forward and the needle is passed back through the goods and the finger on the opposite reel grasps the thread and begins a forward movement, while the opposite reel begins its backward movement delivering the slack to the reel making the forward

stroke; this backward movement continues to the point shown by lower reel, Fig. 1, when the thong is released by the engagement of arm *w* and gate 38, and the reel rests until tripped to take the thread again.

In the diagrams, Figs. 24, 25, and 26, the reels are not shown, the rollers V being indicated as traveling in a horizontal plane. In Fig. 24 the upper roll V is represented as having taken up all the slack, and the needle is ready to descend. In Fig. 25 the needle is represented as having descended and passed through the material and the lower roll V is taking up the slack as it is given up by the return movement of the upper roll V. Fig. 26 represents the reverse of Fig. 24, that is, all the slack taken up by the lower roll V.

The foot *l* has a friction roller 65 on one side of the path of the needle over which the thong is pulled by the upper take-up device; this gives the upward direction to the thong or thread and prevents the pulling of the goods laterally; a similar guide roller is used upon the lower side of the machine, but it is not shown.

Having described my invention, what I claim is—

1. In a sewing machine, the combination of the double pointed thong needle having an eye in the middle, reciprocating finger bars arranged above and below the table and each provided with catch and tripping mechanism, a frictionally yielding take up device and thong carrier mounted thereon, tripping mechanism for operating the thong carrier located on each side of the table and operating alternately, and driving mechanism whereby the finger bars and take up mechanism are operated in appropriate time movements, substantially as specified.

2. In a sewing machine, the combination of the vertically moving needle bars N N on opposite sides of the table each provided with catch mechanism, the tripping lugs 9, the driving mechanism for operating said needle bars, the catch and tripping mechanism, take-up fingers S on each side of the table mounted upon and operated by frictional yielding carrying devices, and driving mechanism operating said carrying devices in appropriate time movements, whereby the slack of the thong is appropriately taken up in the act of drawing the stitch on either side of the goods, substantially as specified.

3. In a sewing machine, the combination of two reciprocating needle bars N, N, a double pointed needle operated alternately by said needle bars and adapted to sew a thong one end of which is fastened to the goods, and the other to the needle, and yielding frictional take-up devices on either side of the table, each consisting of a frictional yielding carrier take-up finger S, engaging device V, and driving mechanism for operating said parts in appropriate time movements, whereby the thong is passed through the goods and the slack of the thong is taken up and the stitch

drawn by the yielding take up mechanism, substantially as specified.

4. In a sewing machine, one or more take-up fingers S, operated by a carrying device 5 and provided with the arm *w* carrying the laterally moving engaging device V, and mechanism for automatically opening the fork to engage and release the thong or thread substantially as specified.

10 5. In a sewing machine, the combination of the guides 49 and 50, the finger S, carrying the arm *w*, the engaging device V, passing between the guides 49 and 50, and the tripping gate 38, operating the arm *w* for releasing and engaging the thong, or thread, substantially as specified.

15 6. In a sewing machine, a take-up device consisting substantially of the rocking shaft 14, the disk 15, the friction disk 16, the spring 20 and the finger S mounted upon the periphery of said disk 16, substantially as specified.

20 7. In a sewing machine, in combination with the rock shaft 14, stationary disk 15, the friction disk 16 provided with spools 22 upon its periphery, the take-up finger S yieldingly attached to the periphery of said disk, and the spring 20 for holding the said disk 16 in frictional engagement with said disk 15, substantially as specified.

25 8. In a sewing machine, the combination of the vertically movable needle bars N N' on opposite sides of the table, each provided with a catch 5, the shafts 8 provided with tripping lugs 9, and the automatic tripping plate 43 provided with the tripping lugs 44 adapted to alternately engage the said trip-

ping lugs 9 for releasing the needle at each alternate stroke of the needle bars, substantially as specified.

9. The combination with the vertically reciprocating needle, the presser foot and a friction roller located on one side of said presser foot, of the friction reels and the take up fingers S mounted thereon and adapted to 40 pull the slack over said roller, substantially as described.

10. In a sewing machine, the combination with the shaft 14, of the rotating disk 15 secured to said shaft, the yielding friction disk 50 16, the lug 32, the stop finger 33, and the tripping finger 36 for stopping and starting the revolution of the take-up reel, substantially as specified.

11. In a sewing machine, the combination of 55 the table, the vertically movable heads M M' on opposite sides of said table, the needle bars N N' mounted on said heads, the double pointed needle O, catch and trip mechanism adapted to operate said needle, the friction- 60 ally mounted reels, and the take up fingers S on each side of said table and mounted upon said friction reels which normally move in a given path but yield to undue strain thereby preventing the thread from breaking when 65 progressively less slack is taken up, substantially as specified.

In testimony whereof I have hereunto set my hand.

LOUIS L. MILLER.

Witnesses:

T. SIMMONS,
C. W. MILES.